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ABSTRACT

This study was designed to demonstrate the effects of teacher attention given for specific responses children show when using building blocks. These included the responses of combining triangles to make rectangles, stacking diverse pieces to make a tower, making stairs, making a variation on a model, and making a house-like, enclosed, roofed structure. Social reinforcement involved the teacher's approving attention, occasionally supplemented by a Polaroid snapshot of a successful or near-successful construction. Experimentally-produced changes in these behaviors during test sessions were displayed for three preschool children. For two children, training (prompting and reinforcing during block play) produced the desired behavior on the trained tasks, but no development was observed on untrained tasks. For the third child, the desired behaviors followed training on three of four trained tasks; but there was no change in response on the fourth task (after four days of training). A fifth task was not trained; nevertheless, appropriate behavior occurred during the last two days of the study. (MH)

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# TECHNICAL REPORT

# RESEARCH

Report No. 18

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UNIVERSITY OF KANSAS

HEAD START EVALUATION AND RESEARCH CENTER

University of Kansas, Lawrence, Kansas

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# EXPERIMENTAL ANALYSIS OF EFFECTS OF TEACHER ATTENTION OF PRESCHOOL CHILDREN'S BLOCK BUILDING BEHAVIOR[1]

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## INTRODUCTION

Teacher attention, in the form of reinforcement and cues ("primes"), has been shown to increase children's social interactions, physical skills, and time spent in activities (Ingram, 1967; Haymes, 1968; Baer and Wolf, 1967; Buell et al., 1968). Within these social and physical categories, increasingly specific behaviors have been defined, such as parallel, sharing, and cooperative social interactions: and climbing up one, two, or three rungs of a jungle gym. Thus the general question is suggested: With increased time spent in any activity, what component behaviors can be defined? For example, in block building, (a frequent activity of preschool children) what component behaviors can be affected by teacher attention?

Blocks are a part of the equipment of every preschool. Hartly, 1952; Johnson, 1935, Brown, 1942, and others, have speculated from descriptive observations what skills are being acquired by using blocks. To date, nothing appears in the literature to define precisely what those skills may be, or to demonstrate what facilitates their acquisition. This study was designed to examine the effects of selective teacher attention on specific block building responses, and thereby help to answer the question: What do children learn at preschool?

PROCEDURE

Three children enrolled at the Child Development Laboratory Schools at the University of Kansas were subjects for this study. Lynn(two years and four months) attended the Toddler Center two days a week. Rick (three years and seven months) and Carol (three years and six months) attended the Preschool four days a week.

Commonly found in preschool settings, unit blocks are natural-finished building blocks, multiples and fractions of which are based on the unit size of 2 5/8 x 5 1/2 x 3/4. These blocks are frequently used during that portion of the day when children choose any activity from those available. Both the Preschool and the Toddler Center were equipped with a large number and variety of unit blocks, stored on open shelves easily accessible to all children.

To measure the specific effects of teacher attention on unit block activity, a "multiple baseline" design of training, with "probes" of training effects, was used. The specific behaviors necessary to such a design were defined differently for Lynn than for Rick and Carol in view of their differing levels of ability with the unit blocks at the outset of the study. These behaviors are listed in Table 1, together with the method of block presentation and instruction used in each case.

INSERT TABLE 1 ABOUT HERE

The multiple baseline design in general consisted of training each of these behaviors separately, one at a time, meanwhile probing the child's current ability to perform all of them, before, during, and after each separate training phase. Specific effects of teacher training would then be seen as improved performance on probes of the behavior trained previously, with little or no improvement in performance on probes of behaviors not yet trained.

Training was conducted during times when the child was active in the block area. Training techniques consisted of prompting the specific block behaviors being trained at that time, and socially reinforcing successful responses or approximations to successful responses. For example; when training a child to use two right triangles to form a rectangle, the teacher would select two such blocks, and present them to the child, saying "I wonder what you could do with these shapes?" She would reinforce those combinations of the blocks which more and more closely approached the desired construction. When achieved, she would comment on the fact that the triangles had been made into a rectangle. Or, when training stair constructions, she would present suitable units, watch for stacking behavior, and reinforce it. When the child had made two stacks in this way, the teacher

TABLE 1

The specific block behaviors looked at systematically and manipulated through a "multiple baseline" procedural design for each subject are as follows:

| Subject | Method of Presenting During Probes | Terminal Response |
|---|---|---|
| Lynn | (2 right triangles to equal 1 rectangle)<br>"Put these blocks together to look just like this one." | 2 right triangles positioned to look like a rectangle |
| | (2 each of cylinders, pillars, rectangles)<br>"Make a tower with these blocks." | 2 cylinders, 2 pillars, 2 rectangles stacked on one base |
| | (6 stacked squares - S given 6 squares)<br>"Make a tower shorter than my tower." | A stack of squares shorter than model stack of 6 squares |
| Rick and Carol | Each task was presented with the required number and shape of blocks to be used by child next to a prearranged structure of the terminal response. The instructions were:<br>"Make these (unconstructed) blocks look just like these." (model of the terminal response) | "stairs"<br>Double units stacked to form five stairs using fifteen blocks |
| | | "triangles"<br>2 right triangles fitted together to make one rectangle |
| | | "cylinders"<br>4 large cylinders and 4 small cylinders stacked vertically |
| | | "pillars"<br>6 pillars stacked vertically |
| | | "house"<br>Units arranged to form an enclosed structure two blocks high with a roof using 16 unit blocks and 4 roof boards |

would comment, "You've built two stacks of blocks. You're a good builder." She would then watch for two stacks being built, and when one of them was higher than the other, would say, "Look, you've made one stack higher!" Then she might push the two stacks together (or prompt the child to do so), saying, "Look what you've done: you've made a stair step! How can you make another stair step?" As a later prompt, she might say, "What happens if you make another stack of blocks here (next to the higher stack), and make it even higher?" When the child had done that, she would say something like, "Hurray! Now you have three stairs!" An observer recorded how much teacher attention was given to such block-building responses, recording every ten seconds whether or not attention was delivered and for what response.

For reinforcement, the teacher used basically her own highly delighted, approving attention. In addition, she occasionally supplemented this with a Polaroid snapshot of the child's successful construction or particularly good approximation, for the child to look at, show to others, and take home. Those block constructions that could be played upon were made available to the child and to all other children in the area -- for example, stairs would be climbed, up and down, with teacher assistance. Alternatively, other small toys and materials that would fit into the block structure were supplied by the teacher, such as dolls or toy animals for house constructions.

Probing was done once a day, or once every several days, as seemed necessary or as time allowed. With Lynn, probes were made at the end of each day; with Rick and Carol, at the beginning of each day. To make a probe, the teacher would take the child aside at a time when there was no one else in the block area, invite him to the block area, and present the blocks and instructions as listed in Table 1, one at a time. The experimenter recorded the child's behavior during the probe, essentially as "success" or "failure" to perform the response requested. No reinforcement or correction was given during the probes.

## RESULTS AND DISCUSSION

Figures 1, 2, and 3 show the behaviors of the three children during the probes. Lynn (two years, four months) was presented with three different block tasks. One of the three tasks was trained as described; the other two tasks were not trained. The trained task was putting two right triangles together to form a rectangle. Figure 1 shows that after the second day of training, Lynn correctly placed the triangles together on two consecutive probes, but showed no development at all on the other two tasks tower and shorter tower.

Carol was presented with five block tasks. Carol received training on two block tasks. As shown in Figure 2, those two tasks were performed correctly on probe sessions following training - after the 7th training

day for the "house" task, and after the first training day for the "stairs" task - but never before. The other three tasks, not trained, were never performed correctly.

For Lynn and Carol, no task untrained was ever performed correctly. For each task to which the training procedure was applied, the task was consistently correct thereafter.

The cumulative terminal responses made by Rick are shown in Figure 3. In the upper graph it is seen that after training the terminal response was made for the "stairs", "triangle", and "cylinder" tasks. This demonstrates the same effect of training as shown in Figures 1 and 2 for Lynn and Carol.

The lower graph shows the cumulative responses of the "pillar" task which failed to reach criterion after four days of training. The responses on the untrained "house" task are also recorded in the lower graph. It was not until day 21 that the terminal response was made.

The number of days (following the onset of training) for Rick to make the terminal response on successfully trained tasks ranged from one to six. On this basis it might be suggested that the terminal response on the "pillar" task might have been made, had there been more training days.

Rick made terminal responses on the cylinder and pillar tasks during baseline. This, however, was not consistent performance. These two tasks were similar in that they both required stacking and balancing skills (behaviors), and both required positioning the blocks on their small bases. The same simple response is repeated six times in the pillar task and eight times in the cylinder task. There is immediate feedback from the blocks - they either stand or fall as the responses are made. These two considerations may contribute to the occurrence of the response during baseline. On the other hand, the positioning of the blocks on an uneven floor coupled with the rough edges of the blocks may account for the inconsistent behavior.

For the "cylinder" task, the addition of selective attention during training appeared to increase the frequency and consistency of making the terminal response. It remains unknown whether additional training days would have produced similar results for the pillar task. School ended at that point, and the study necessarily was ended.

The "house" task was not trained. It was not until very late in the study and after 13 probe sessions that it emerged as correct. This task perhaps incorporates skills of positioning, stacking, and balancing which Rick acquired in previously trained tasks.

Table 2 shows the behavior of the teacher during free block activity time and during training procedures. These data say that the teacher did

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what she planned to do - her interaction with each child was specific to a task. There were no correct terminal performances during block activity times prior to training for each performance.

INSERT TABLE 2 ABOUT HERE

The systematic application of attention to specific block behaviors of preschool children appears to be effective in changing behaviors of a two and a three year old child. Age differences ranging between the two and three and a half year levels apparently were not a factor in the application of this procedure to increase particular block building skills.

Figures 1, 2, and 3 report terminal behaviors only. However, there was evidence that as training was carried out the children displayed increased approximations to the terminal responses. The two triangles would be placed together to form a parallelogram instead of a rectangle; three of the five stairs would be correct; the house would be enclosed but only one block high instead of two; or all the large cylinders would be stacked, but only 1 or 2 of the small ones -- then the full blown terminal response would be emitted.

The change in probe behavior might be described as the generalization of a correct response acquired during training and under an intermittent schedule of reinforcement. Social reinforcement in the form of teacher attention occurred during training but not during the probes. Until the conditions of training were applied, with the exception of two tasks for one child, incorrect responses occurred consistently.

TABLE 2

Percent of teacher attention (training) directed to each response for two subjects on each day of the study. (Percentage is based on number of 10 second intervals during block activity time).

| Day of Study | Subjects | Responses | | | | |
|---|---|---|---|---|---|---|
| | | ● | △ | 0 | ▭ | □ |
| 1 | Rick | | | | | |
| | Carol | | | | | 1 |
| 2 | Rick | | | | | |
| | Carol | | | | | |
| 3 | Rick | | | | | |
| | Carol | | | | | |
| 4 | Rick | | | | | |
| | Carol | | | | | |
| 5 | Rick | | | | | |
| | Carol | | | | | |
| 6 | Rick | | | | | |
| | Carol | | | | | |
| 7 | Rick | 7 | | | | |
| | Carol | | | | | 1 |
| 8 | Rick | 24 | | | | |
| | Carol | | | | | 6 |
| 9 | Rick | 3 | | | | |
| | Carol | | | | | 9 |
| 10 | Rick | 12 | | | | |
| | Carol | | | | | 10 |
| 11 | Rick | 6 | | | | |
| | Carol | | | | | 5 |
| 12 | Rick | | 13 | | | |
| | Carol | | | | | 3 |
| 13 | Rick | | 2 | | | |
| | Carol | | | | | 22 |
| 14 | Rick | | 15 | | | |
| | Carol | | | | | 4 |
| 15 | Rick | | | 1 | | |
| | Carol | | | | | 10 |
| 16 | Rick | | | 20 | | |
| | Carol | | | | | 8 |
| 17 | Rick | | | | 13 | |
| | Carol | | | | | 12 |
| 18 | Rick | | 1 | | 8 | |
| | Carol | | | | | 10 |
| 19 | Rick | | | | 12 | |
| | Carol | 30 | | | | 2 |
| 20 | Rick | | | | | |
| | Carol | 26 | | | | |

(When no percentage is recorded no attention was given to that response)

Figure 1: Cumulative terminal responses for three block behaviors are shown for one subject over successive probe sessions. The effects of training are demonstrated for the one trained behavior using triangular blocks. Training was not applied to building a tower or a shorter tower and these behaviors remained unchanged.

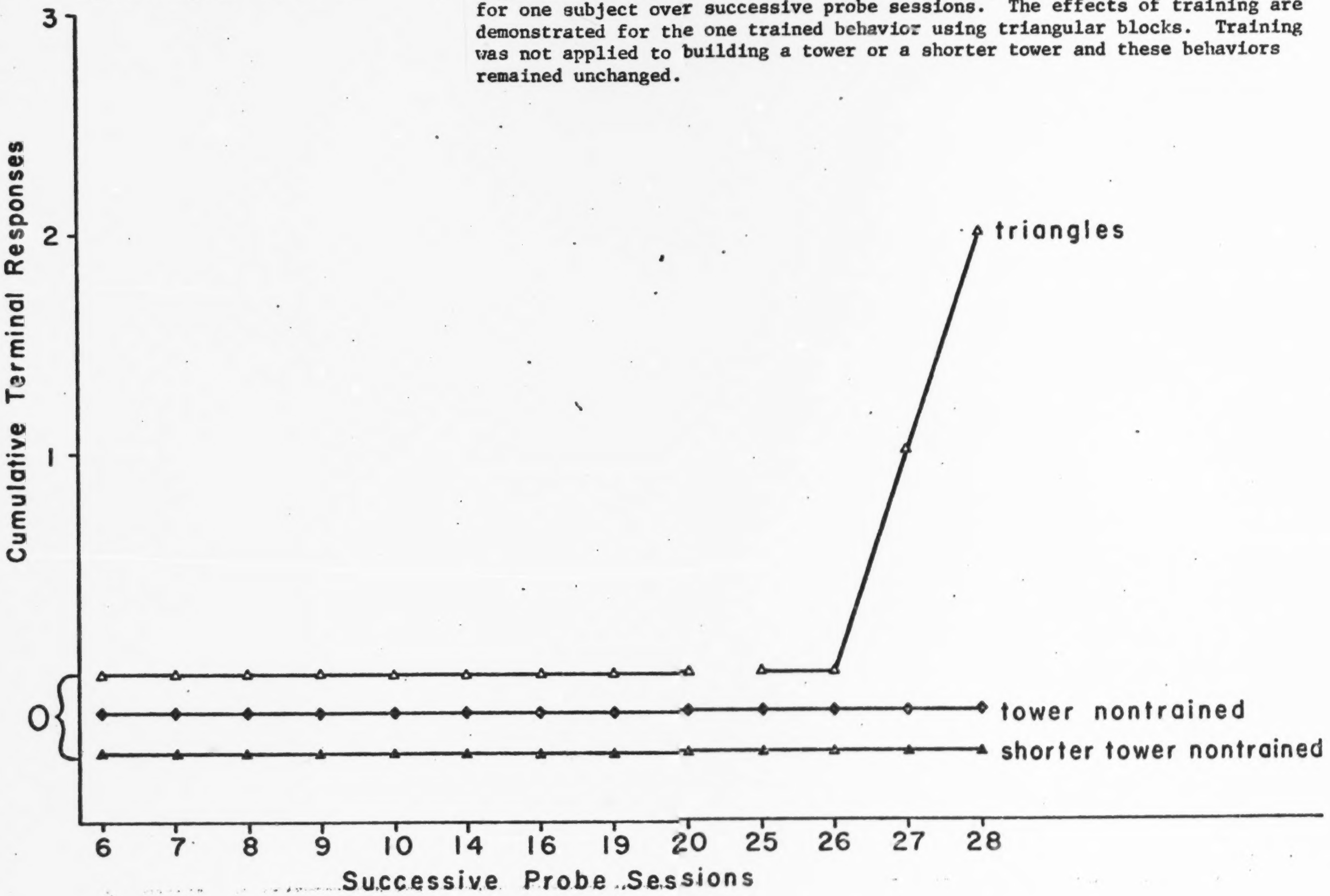


Figure 2: Cumulative terminal responses for five block behaviors are shown for one subject over successive probe sessions. The effects of training are demonstrated for the two trained behaviors: building a house and building stairs. Behaviors using triangular, pillar, and cylindrical blocks were not trained and remained unchanged.

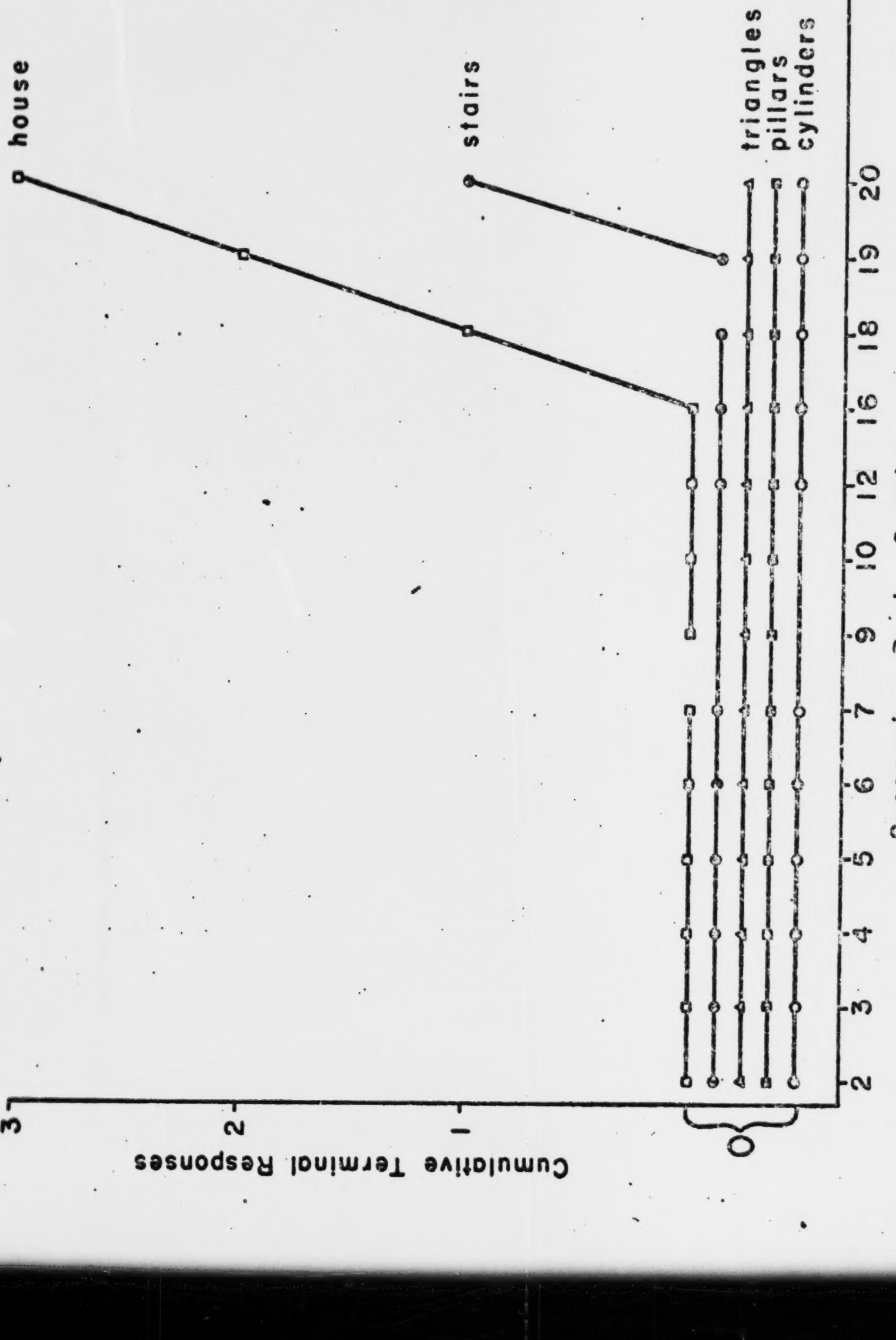
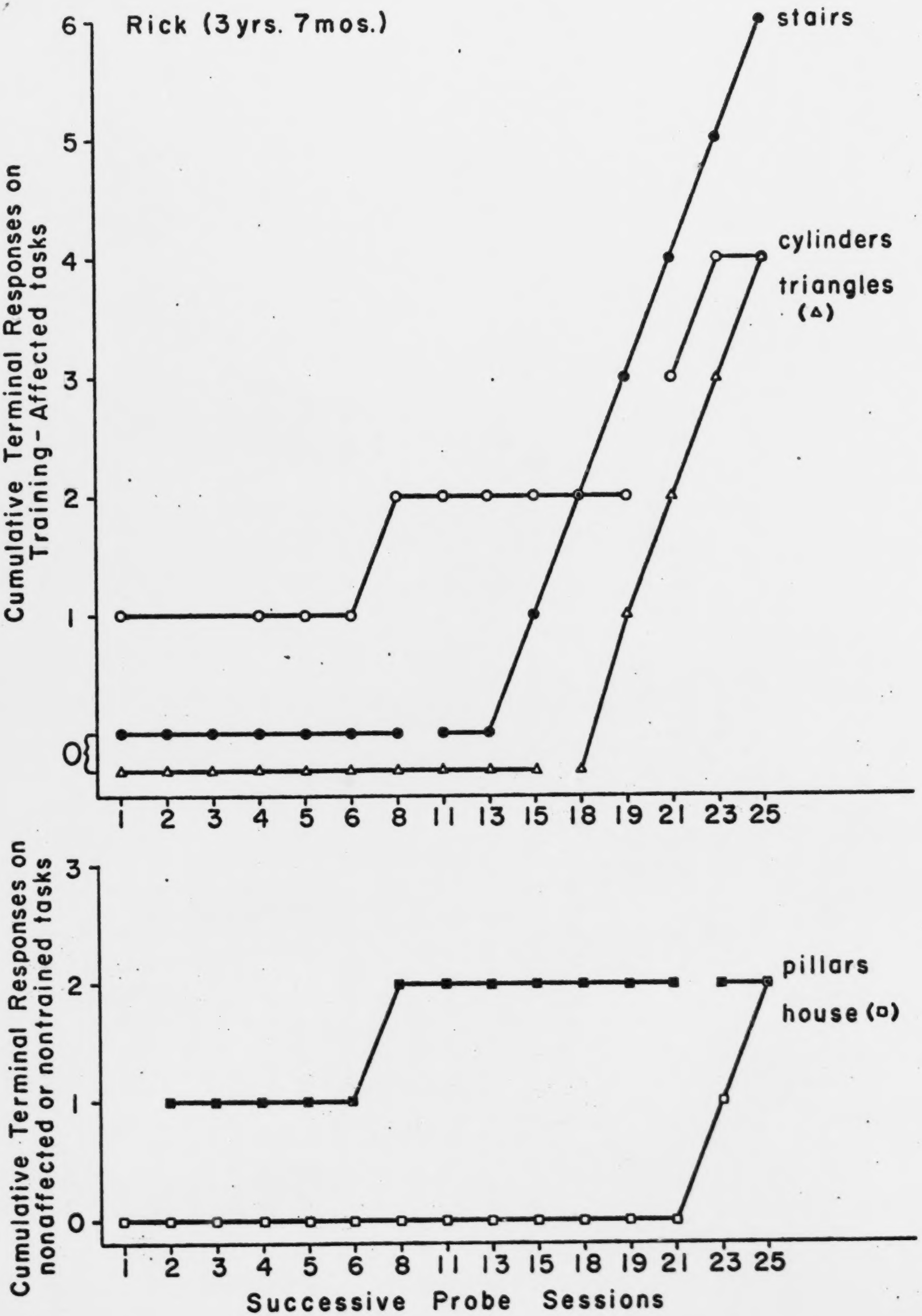


Figure 3: The upper figure shows the cumulative terminal responses for three trained behaviors over successive probe sessions. Training began where the line breaks for each behavior. The cylinder response appeared correctly twice during baseline. All three behaviors were correct on probes after training was instituted.

The lower figure shows the cumulative responses for two other block behaviors over successive probe sessions. The pillar response appeared correctly once during baseline and was not effected by training. The house response was never trained but was correct on probes after the 21st day of the study.


Rick (3yrs. 7mos.)
Cumulative Terminal Responses on Training-Affected tasks
6
5
4
3
2
1
0
stairs
cylinders
triangles (△)
1 2 3 4 5 6 8 11 13 15 18 19 21 23 25
Cumulative Terminal Responses on nonaffected or nontrained tasks
3
2
1
0
pillars
house (□)
1 2 3 4 5 6 8 11 13 15 18 19 21 23 25
Successive Probe Sessions

## Footnotes

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